Ordering number: EN4528A

Monolithic Digital IC

No. 4528A

SANYO

LB1643

Forward/Reverse Motor Driver with Brake

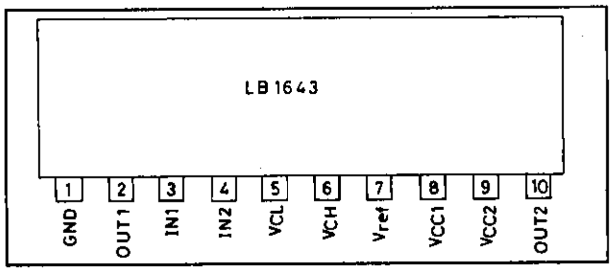
OVERVIEW

The LB1643 is a forward/reverse motor driver IC. The direction and brake functions are controlled from a single input, and the output voltages can be set by resistors. Further, the output voltage has 3 modes, full, HIGH-level and LOW-level voltage modes. The output voltage can be controlled from a single input and a microcontroller interface.

FEATURES

- Single-input forward, reverse and brake functions
- Output voltage can be set using resistors
- Single-input full-drive, HIGH-level drive and LOW-level drive select function
- Microcontroller interface
- Built-in surge-current absorption components
- Built-in reference voltage circuit
- Built-in thermal protection circuit

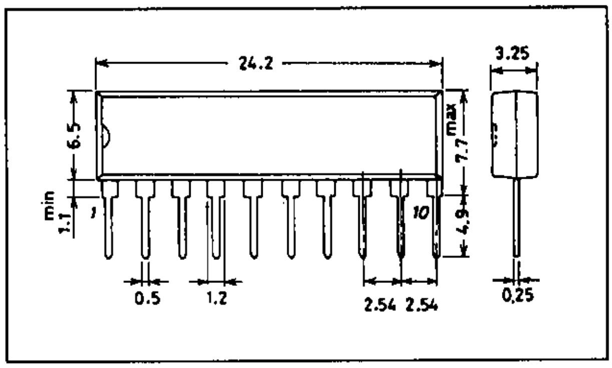
PIN ASSIGNMENT

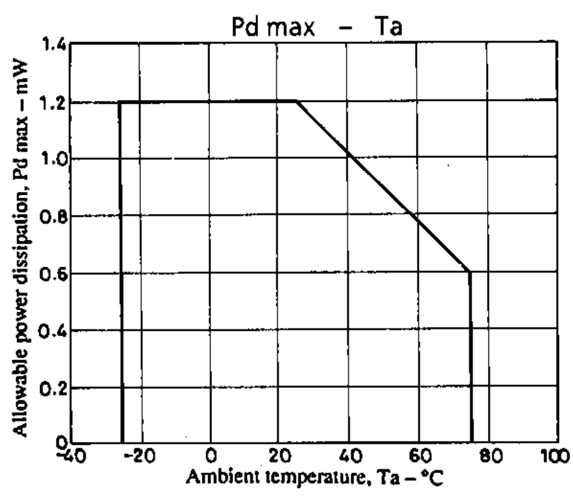


PACKAGE DIMENSIONS

Unit: mm

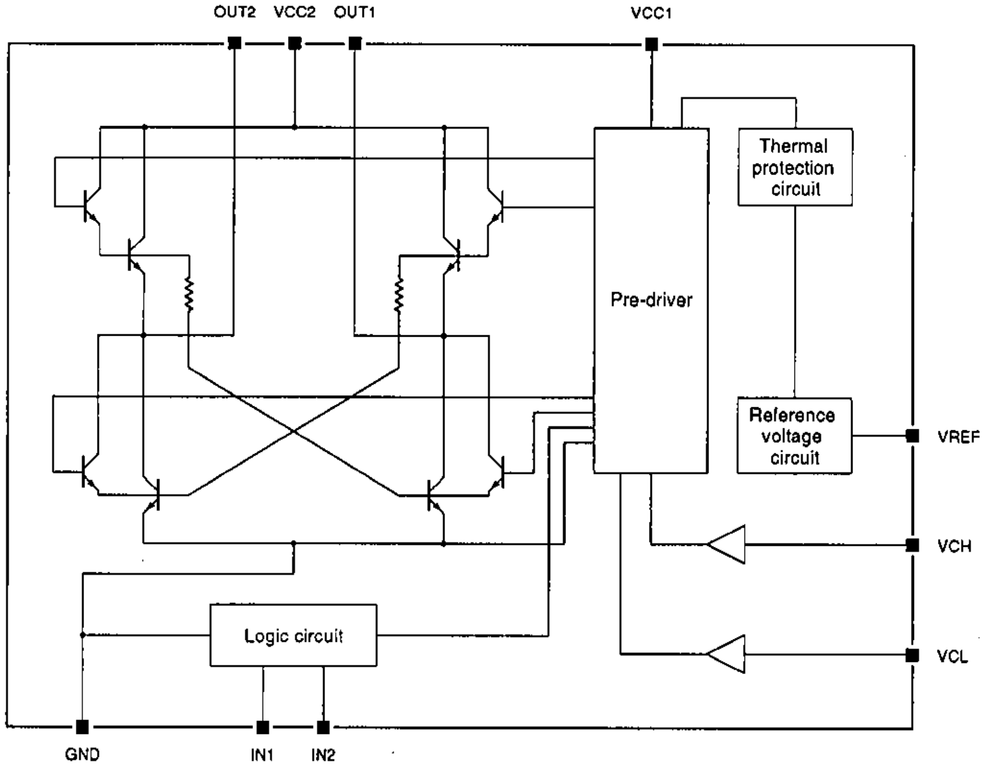
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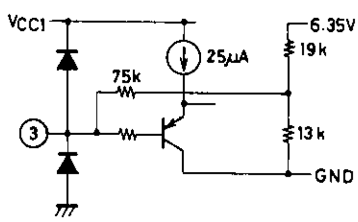
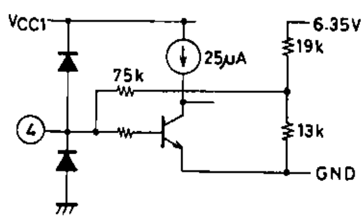
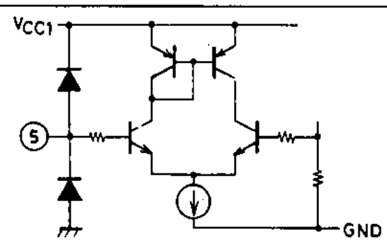


SANYO Electric Co., Ltd. Semiconductor Business Headquarters
TOKYO OFFICE Tokyo Bldg., 1-10, 1 Chome, Ueno, Taito-ku, TOKYO, 110 JAPAN

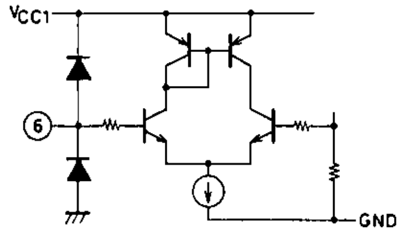
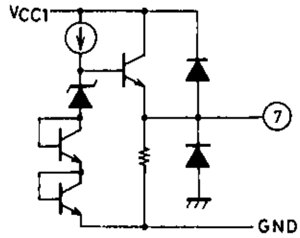
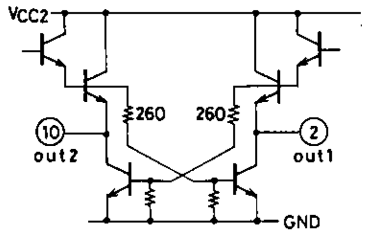
BLOCK DIAGRAM



PIN DESCRIPTION

Number	Name	Equivalent circuit	Description
1	GND		Power and signal ground
3	IN1		Output voltage control input terminal $V_M \cong 2.5$ V when input is open.
4	IN2		Forward, reverse and brake control input terminal $V_M \cong 2.5$ V when input is open.
5	V_{CL}		Output voltage set terminal

Unit (resistance: Ω)

Number	Name	Equivalent circuit	Description
6	V_{CH}		Output voltage set terminal
7	Vref		Reference voltage output. V_{ref} = 6.35 V
8	VCC1		Signal voltage supply
9	VCC2		Power voltage supply
2	OUT1		Motor coil connection terminals
10	OUT2		

Unit (resistance: Ω)

SPECIFICATIONS

Absolute Maximum Ratings

T_a = 25 °C

Parameter	Symbol	Condition	Rating	Unit
Supply voltage	V_{CC} max		18	V
Input voltage range	V_{IN}	$V_{CC} > V_{IN}$	–0.3 to +6	V
Output current	I_{OUT}		±1.6	A
Power dissipation	P_d max		1.2	W
Operating temperature range	Topr		–25 to +75	°C
Storage temperature range	T_{stg}		–55 to +125	°C

Recommended Operating Conditions

T_a = 25 °C

Parameter	Symbol	Condition	Rating	Unit
Supply voltage ranges	V_{CC1}		8.0 to 18	V
	V_{CC2}	$V_{CC1} \geq V_{CC2}$	5 to 18	V
Forward-reverse direction prohibit time	t_{OFF}		≥ 20	µs

Electrical Characteristics

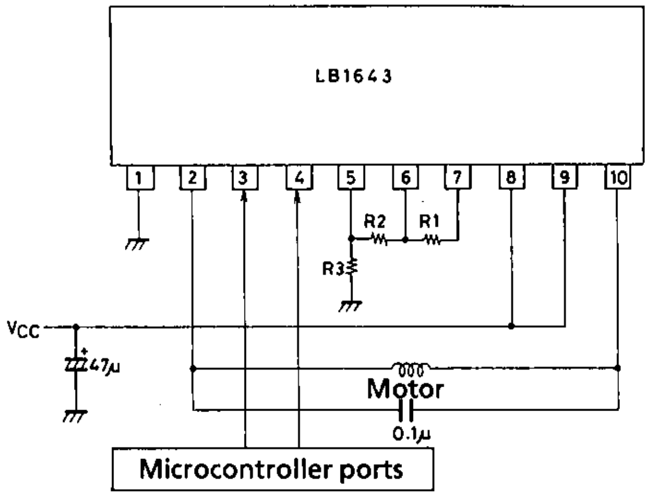
T_a = 25 °C, V_{CC} = 12 V

Parameter	Symbol	Condition	Rating			Unit
			min	typ	max	
LOW-level input voltage	V_{INL}		0	–	1.0	V
HIGH-level input voltage	V_{INH}		4.2	–	6.0	V
MID-level input voltage	V_{INM}		2.0	–	3.0	V
Input impedance	Z_{IN}		–	75	–	kΩ
Current consumption	I_{CC}		–	5.5	10	mA
Output voltages	V_{OUT1}	R_L = 60 Ω, V_{CH} = 2.5 V, V_{IN1} = 2.5 V, V_{IN2} = 0 V	4.4	4.95	5.4	V
	V_{OUT2}	R_L = 60 Ω, V_{CH} = 2.5 V, V_{IN1} = 2.5 V, V_{IN2} = 5.0 V	4.4	4.95	5.4	V
Output leakage current	I_{OL}	R_L = ∞	–	0.01	1.0	mA
Saturation voltages (upper)	V_{sat11}	V_{CC} = 12 V, I_{OUT} = 300 mA	–	1.9	2.2	V
	V_{sat12}	V_{CC} = 12 V, I_{OUT} = 500 mA	–	1.9	2.3	V
Saturation voltages (lower)	V_{sat21}	V_{CC} = 12 V, I_{OUT} = 300 mA	–	0.25	0.5	V
	V_{sat22}	V_{CC} = 12 V, I_{OUT} = 500 mA	–	0.4	0.65	V
Reference voltage	V_{ref}		6.0	6.35	6.8	V
Reference voltage load characteristics	$\frac{\Delta V_{ref}}{\Delta I_{ref}}$	I_{ref} = –2.0 to 0 mA	–	0.05	0.1	V/mA
Control to output gain	V_{OUT}/V_{CH}, V_{OUT}/V_{CL}	V_{CH} = 2.5 V, V_{CL} = 2.5 V, R_L = 60 Ω	1.5	1.90	2.4	–
Thermal shutdown temperature	T_{TSD}	See note.	150	180	–	°C

Note

Design value only (not measured).

TYPICAL APPLICATION



Unit (Capacitance : F)

Notes

1. Use a microcontroller with CMOS output ports for HIGH-level, LOW-level and open-circuit conditions.
2. It is recommended that R1, R2 and R3 total approximately 60 kΩ.
3. The input voltage for IN1 and IN2 should be 0 to 6 V to ensure the output voltage does not cause incorrect operation. Furthermore, IN1 and IN2 voltages should not be applied if the V_{CC} supply is not applied.
4. To avoid occurrences where both the upper and lower transistors are ON simultaneously, make sure IN1 or IN2 is open for a period of tens of ms before switching control to the opposite device.
5. Connect a 20 μF or larger capacitor between VCC and GND.
6. A large current of several hundred mA flows in the motor circuits when the motor is being driven. Accordingly, the output current line and the input circuit should be wired so that they do not have a common impedance.

LOGIC TABLE

Input		Output voltage		Operation
IN1	IN2	OUT1	OUT2	
HIGH	HIGH	LOW	FULL	Forward (reverse)
MID	HIGH	LOW	$2V_{CH}$	
LOW	HIGH	LOW	$2V_{CL}$	
HIGH	MID	OFF	OFF	Brake
MID	MID	OFF	OFF	
LOW	MID	OFF	OFF	
HIGH	LOW	FULL	LOW	Reverse (forward)
MID	LOW	$2V_{CH}$	LOW	
LOW	LOW	$2V_{CL}$	LOW	

Input levels are

- $V_H \geq 4.2$ V
- $V_M = 2.0$ to 3.0 V
- $V_L \leq 1.0$ V

When IN1 and IN2 are open, they take on a voltage of 2.5 V.